

Additions to the Knowledge of the Genus *Phimenes* (Hymenoptera: Vespidae: Eumeninae) from Vietnam

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ABSTRACT

The solitary wasp genus *Phimenes* Giordani Soika, 1992 (Hymenoptera: Vespidae: Eumeninae) was reported to occur in Vietnam by van der Vecht (1959), represented by one taxon, *Phimenes flavopictus continentalis* (Zimmermann), which was synonymized under nominotypical *Phimenes flavopictus* (Blanchard, 1849) by Kumar (2013). A note on gender of this genus is made in the text. One more species, *Phimenes indosinensis* (van der Vecht, 1959) is recorded in this study from Dak Lak in the southern and Son La in the northwestern parts of Vietnam for the first time. Detailed descriptions of the female and male of the latter are provided with figures. A key to the two species from Vietnam is also provided.

Keywords: Vespidae, Eumeninae, *Phimenes*, new records, Vietnam

INTRODUCTION

The genus *Phimenes* was proposed by Giordani Soika (1992) as a replacement name for *Phi* de Saussure 1855, *non de Saussure* 1854. The homonymy of De Saussure's (1855) name was pointed out by Carpenter (1986), who treated it as a synonym of *Delta* de Saussure, 1855. This was overlooked by subsequent authors (e.g., Giordani Soika, 1987; Giordani Soika and Kojima, 1988; Gusenleitner, 1988), who used the unavailable name. Later, van der Vecht and Carpenter (1990) reconfirmed the homonymy and Giordani Soika (1992) proposed the replacement name.

The first *Phimenes* taxon recorded from Vietnam (Hanoi city, Tuyen Quang, and Kien Giang provinces) was *Phimenes flavopictus continentalis* (Zimmermann) by van der Vecht (1959), as *Eumenes flavopictus continentalis*. Later the taxon was recorded from several other provinces in the northern part of the country (Lao Cai, Bac Kan, Thai Nguyen, Vinh Phuc, Bac Giang, and Thanh Hoa) by Nguyen et al. (2014). Recently, this subspecies was synonymized under the nominate species by Kumar (2013). We follow this synonymy, and add a note on gender of the genus *Phimenes* below.

In this paper, based on specimens deposited in the Institute

of Ecology and Biological Resources (IEBR), one species of the genus *Phimenes* is recorded from Vietnam for the first time. The female and male of the newly recorded *Phimenes* species are redescribed and figures, and a key to the two species from Vietnam is also provided.

MATERIALS AND METHODS

The material examined in the present study is deposited in the collections of the IEBR.

The adult morphological and color characters were observed on pinned and dried specimens under a stereoscopic microscope. Measurements of body parts were made with an ocular micrometer attached to a stereoscopic microscope. "Body length" indicates the lengths of head, mesosoma and the first two metasomal segments combined. Terminology follows Yamane (1990). Photographic images were made with the Canon PowerShot SX1 IS, Japan and the Leica EZ4HD 3.0 MegaPixel Digital Stereo Microscope, Germany, using LAS exclusive microscopy software (LAS EZ 2.0.0); the images were further processed with Photoshop CS6, mostly to adjust the size and background.

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Collector is abbreviated as follows: IED-c, staff of the Insect Ecology Department; ISD-c, staff of the Insect Systematic Department (IEBR). “NP” stands for National Park.

SYSTEMATIC ACCOUNTS

Genus *Phimenes* Giordani Soika, 1992

Phimenes Giordani Soika, 1992: 41, 66, genus, replacement name for *Phi* de Saussure, 1855, *non* de Saussure, 1854. Type species: *Vespa arcuata* Fabricius, 1775, by subsequent designation of Bequaert, 1926: 487, as type species of *Phi* de Saussure, 1855.

Phi de Saussure, 1855: 132, 145, name for division IV of genus *Eumenes* Latreille in de Saussure, 1852: 63 (invalid homonym of *Phi* de Saussure, 1854).

Type species: *Vespa arcuata* Fabricius, 1775, by subsequent designation of Bequaert, 1926: 487.

Diagnosis. According to de Saussure (1852), this genus is distinguished by the characters given for his DIVISIONS II and IV of the genus *Eumenes*, combined as stated on p. 63 under DIVISION IV “Lèvre et mâchoires comme dans la deuxième division”, [“Labium and maxilla as in the second division”], which refers to p. 44 [our translation], Labium long, the middle portion of the tongue deeply bifid, feathery, lateral lamina perfectly linear, second article of palps longer than the first. Maxilla: the galea one and half times as long as the basal part. Palpal segments not decreasing gradually in length from first to last, but the second substantially longer than the first, and the last three very small, all just as long as the third: the first bulging at midpoint, and the second arcuate, bulging at the end [back to p. 63 for the rest of the diagnosis], Mandibles very long. Petiole linear, very long (one and half times as long as the thorax or more) without projecting tubercles. Abdomen compressed, higher than wide; the second segment bell-shaped, narrowed basally to continue as a little petiole, and a little less wide posteriorly than in middle.

***Phimenes flavopictus* (Blanchard, 1849) (Fig. 1A–F)**

Eumenes flavopictus Blanchard, 1849: 8, Pl. 2 figs. 2, 6, type locality: not given (Museum National d’Histoire Naturelle, Paris).

Eumenes arcuata continentalis Zimmermann, 1931: 205, 224, 226, fig. 26, no. 3, female, male, “Sikhim” (holotype female, Zoologisches Museum der Humboldt Universität, Berlin).

Eumenes flavopictus continentalis; van der Vecht, 1959: 15 (key), 36, figs. 3b, 4(19), 5e, 7(19).

Phimenes flavopictus continentalis; Kumar, 2013: 120.

Kumar (2013: 120) synonymized *Phimenes flavopictus continentalis* Zimmermann, 1931, under the nominate species, as *Phimenes flavopictus* (Blanchard, 1845). The correct combination is *Phimenes flavopictus* as *flavopictus* is a Latin adjective for yellow-colored, and it must agree in gender with the genus. *Phimenes* is derived from *Phi* + *Eumenes*, and the latter is of masculine gender (being the Greek word for friend), hence *flavopictus* is correct. The form *flavopictum* is the neuter form of the adjective, hence incorrect in combination with *Phimenes*. Kumar (2013: 120) also gave the date of Blanchard’s description as 1845, which is the date listed on the website he cited. The date 1840 had been given for this taxon since Dalla Torre (1894), but van der Vecht (1959: 32 footnote) called attention to uncertainty about that date, as the work in question was published between 1839–1849. As van der Vecht mentioned, Blanchard (1840) did not discuss or figure *Eumenes flavopictus*. Finally, we have seen a copy of the volume published in 1849 where Blanchard’s name was published that allows us to date it at 1849.

This species has been recorded from India, Sri Lanka, Nepal, China, Myanmar, Thailand, Malaysia, Singapore and Indonesia (Carpenter, unpublished). In Vietnam, the species was recorded from several provinces in the northern part of the country such as Lao Cai, Bac Kan, Ha Noi, Thai Nguyen, Tuyen Quang, Vinh Phuc, Bac Giang, Thanh Hoa, and Kien Giang by van der Vecht (1959) and Nguyen et al. (2014), and is recorded from Ha Giang, Cao Bang, Son La, Phu Tho, Hoa Binh, Hai Phong, Ninh Binh, Nghe An, Ha Tinh, Quang Binh, Quang Tri, Quang Nam, Gia Lai, and Dak Lak as new records for the areas in the present study.

Material examined. Vietnam: Ha Giang: 1 female, Vi Xuyen, Dao Duc, 20 Oct 2006, Khuat LD; 1 male, Yen Minh town, Yen Minh, 23°7’6”N, 105°8’20”E, 30 Nov 2014, Truong LX, Nguyen LTP, Nguyen MP, Nguyen DD; Lao Cai: 1 female, Nam Cuong, 19 Aug 2006, Nguyen LTP, Saito F, Kojima J; Tuyen Quang: 1 male, Trang Da, Tuyen Quang city, 21°55’48”N, 105°14’23”E, 1 Dec 2014, Truong LX, Nguyen LTP, Nguyen MP, Nguyen DD; Cao Bang: 1 female, Phi Oac, 1,035 m, 22°35’34”N, 105°51’25”E, 7–10 May 2013, Hoang TV; Bac Kan: 1 male, Lang San, Na Ri, 270 m, 21°15’N, 106°6’E, 3–4 Aug 2012, Kojima J, Nugroho H, IED-c; 1 male, Vu Muon, Bach Thong, 550 m, 22°12.5’N, 105°58’E, 5 Aug 2012, Nguyen LTP, IED-c; 1 female, Lang San, Na Ri, 270 m, 21°15’N, 106°6’E, 3–4 Aug 2012, Kojima J, Nugroho H, IED-c; 3 females, Kim Hy NR, An Tinh, Na Ri, 22°12’31”N, 106°5’2”E, 3 Jun 2014, Nguyen LTP, Nguyen DD, Tran DD; 1 female, Kim Hy NR, Lang San, Na Ri, 22°14’N, 106°5’E, 3 Jun 2014, Nguyen LTP, Nguyen DD, Tran DD; Son La: 1 female, Nam Pam, Muong La, 660 m, 25 Jul 2009, Nguyen LTP, Pham PH, Kojima J; Phu Tho:

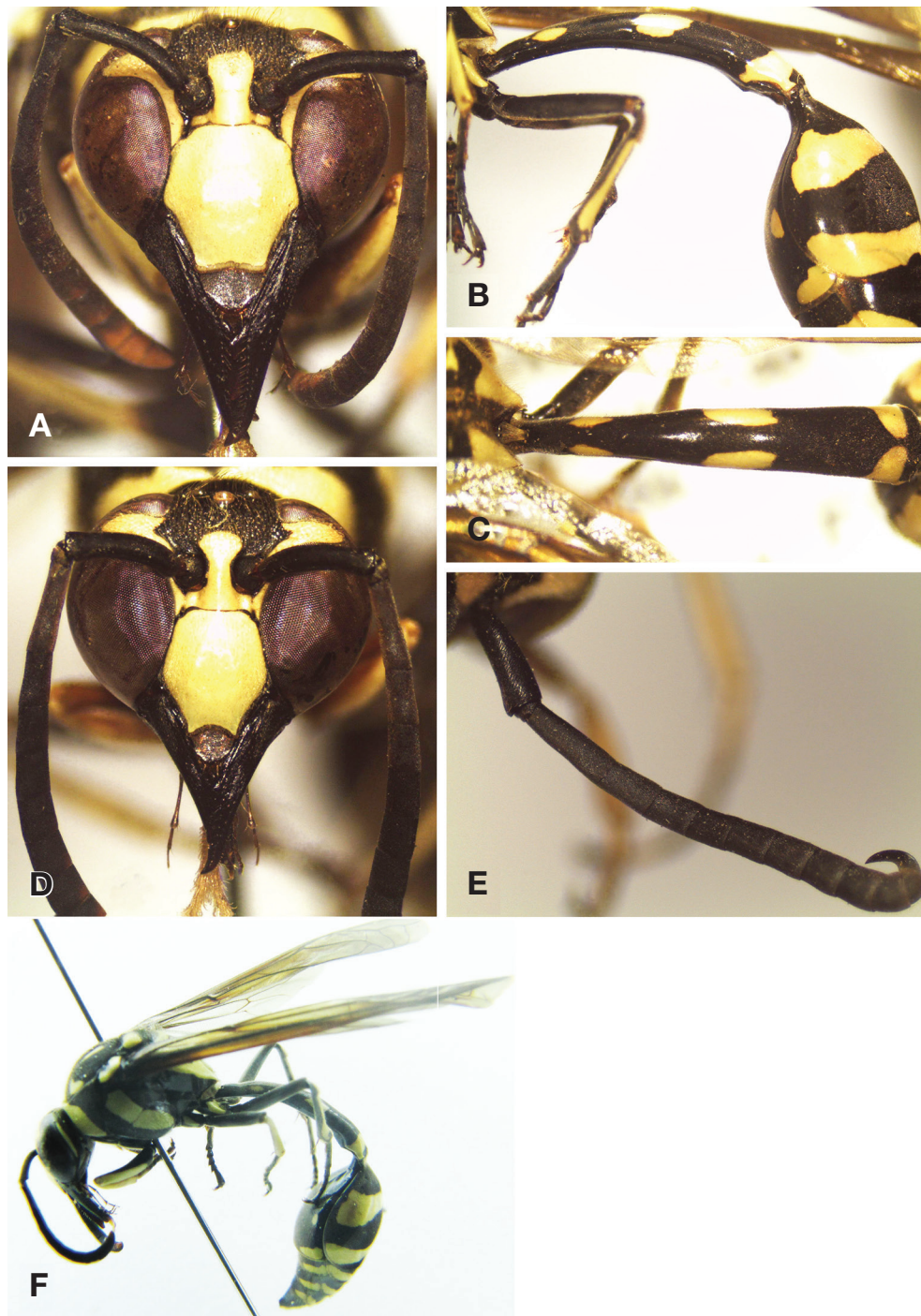


Fig. 1. *Phimenes flavopictus* (Blanchard). Female: A, Head in frontal view; B, Metasomal segment I and II in lateral view; C, TI in dorsal view. Male: D, Head in frontal view; E, Right antenna; F, Female habitus.

1 female, Xuan Son NP, 6–9 Dec 2003, Truong LX; 1 male, Xuan Son NP, 6–9 Dec 2003, Truong LX; Vinh Phuc: 1 female, Trai Trau, Me Linh, 100 m, 22 Aug 2000, Nguyen LTP; 1 female, Trai Trau, Me Linh, 100 m, 27 Aug 2000,

Nguyen LTP; 1 female, Tam Dao NP, 400 m, 21°26'N, 105° 37'E, 20 Aug 2005, Kojima J; 1 female, Tam Dao NP, < 50 m, 21 Aug 2005, Nguyen LTP, Kojima J; 1 female, Me Linh station, Me Linh, 13–14 May 2013, Nguyen LTP; 1 male,

Me Linh station, Me Linh, 25 May 2013, Nguyen LTP; 1 female, Ngoc Thanh, Me Linh, 13 Jun 2001, Truong LX; 3 females, Trai Trau, Me Linh, 100 m, 27 May 2000, Nguyen LTP; 1 male, Tam Dao NP, 500–700 m, 20 Aug 2005, Kojima J; 1 male, Ngoc Thanh, Me Linh, 20 Jul 2000, Khuat LD; 1 female, Trai Trau, Me Linh, 100 m, 24 May 2000, Nguyen LTP; Ha Noi: 1 female, Van Hoa, Ba Vi, 3 Jun 2001, Nguyen LTP; 1 male, Khoang Xanh, Yen Hoa, Ba Vi, 100 m, 1 Jun 2001, Nguyen LTP; 1 female, Van Hoa, Ba Vi, 3 Jun 2001, Nguyen LTP; Hoa Binh: 1 male, Lac village, Chieng Chau, Mai Chau, 600 m, 10 Jun 2008, Nguyen LTP, Pham PH; 1 male, Bao Hieu, Yen Thuy, 30 Aug 2000, Nguyen LTP; 1 male, Da Phuc, Yen Thuy, 19 Aug 2000, Hoang TV; 1 female, Da Phuc, Yen Thuy, 5 Jul 2000, Truong LX; 1 female, Pa Co, Mai Chau, 1,000 m, 23 Aug 2005, Nguyen LTP, Kojima J; Bac Giang: 1 male, Thanh Son town, Son Dong, 120 m, 5 Jul 2010, Pham PH; 1 female, Thanh Son, Son Dong, 300 m, 1 Jul 2010, Pham PH; 1 male, Thanh Lam, Son Dong, 120 m, 2 Jul 2010, Tran DD; Hai Phong: 1 male, Dao Khi, Cat Ba NP, Cat Hai, 31 m, 20°43'81"N, 107°4'74"E, 26 Jul 2013, Nguyen LTP, Nguyen DD; 1 male, Cat Ba NP, Cat Hai, 10 Jun 2003, Khuat LD; 1 female, Cat Ba NP, Cat Hai, 20°50'39"N, 106°56'42"E, 24 Jul 2013, Nguyen LTP, Nguyen DD; Thanh Hoa: 1 female, Xuan Hoa, Nhu Xuan, 29 May 2008; 1 male, Xuan Lien NR, Hon Can, Van Xuan, Thuong Xuan, 106 m, 19°52'27.5"N, 105°14'21"E, 24 Aug 2012, Nguyen LTP; 1 female, Xuan Lien NR, Hon Can, Van Xuan, Thuong Xuan, 106 m, 19°52'27.5"N, 105°14'21"E, 24 Aug 2012, Nguyen LTP; 1 male, Xuan Hoa, Nhu Xuan, 29 May 2008; 4 females, Xuan Hoa, Nhu Xuan, 29 May 2008; 1 male, Xuan Lien NP, Hoa Can, Van Xuan, Thuong Xuan, 23 Aug 2012, Nguyen LTP; Ninh Binh: 1 female, Cuc Phuong NP, 9 May 2002, Hoang TV; Nghe An: 1 female, Khe Bu, Pu Mat, Chau Khe, Con Cuong, 27 May 1998, Khuat LD; Ha Tinh: 1 male, Rao An, Huong Son, 20 Apr 1998, Khuat LD; 1 female, Huong Trach, Huong Khe, 22 May 2008; 1 male, Son Tho, Vu Quang, 24 May 2018; 2 male, Khe Van, Son Hong, Huong Son, 120–180 m, 24 Apr 2004, Truong LX; 1 male, Son Tay, Huong Son, 19–24 May 2004, Nguyen LTP; 1 female, Son Tay, Huong Son, 19–24 May 2004, Nguyen LTP; Quang Binh: 1 female, U Bo, Truong Son, 650–800 m, 10 May 2006; 1 male, U Bo, Truong Son, 650–800 m, 10 May 2006; 1 male, U Bo, Truong Son, Quang Ninh, 500 m, 11 May 2007, ISD-C; Quang Tri: 1 male, Huc Nghi, Dak-rong, 1 Jun 2006, 150–200 m, ISD; Quang Nam: 1 female, Phuoc My, Phuoc Son, 450–500 m, 26 May 2006; 1 female, Macoil, Dong Giang, 27 May 2006; 1 female, Phuoc My, Phuoc Son, 450–500 m, 26 May 2006, ISD-c; Gia Lai: 1 female, Kon Ka Kinh NP, Dac Jo Ta, Mang Yang, 800–850 m, 8 Jun 2011, ISD-c; 1 female, Ia Pal, Chu Se, 369 m, 13°39'46"N, 108°8'4"E, waterfall, 20 Jul 2012, Nguyen LTP;

Dak Lak: 1 female, Dak La station, Yok Don NP, Buon Don, 198 m, 12°53'49"N, 107°42'49"E, Nguyen LTP.

***Phimenes indosinensis* (van der Vecht, 1959)**

(Fig. 2A–F)

Eumenes indosinensis van der Vecht, 1959: 12 (key), 18, figs. 2b, 5a, 6(1), female, male, “Thaungyin” (holotype male, Oxford University Museum, Oxford).

This species is distributed in India (Meghalaya), Myanmar and Laos (van der Vecht, 1959, 1981), and newly recorded from Vietnam in this study.

Material examined. Vietnam: Son La: 1 female, Vo Nguyen Giap forest, Gia Phu, Phu Yen, 21°13'8"N, 104°32'48"E, 310 m, 17 Jun 2015, Nguyen DD; Dak Lak: 1 male, Dak La station, Dak Lak NP, Buon Don, 12°53'48.7"N, 107°42'48.7"E, 200 m, 9 Jun 2013, Nguyen LTP.

Redescription of *Phimenes indosinensis* is provided here with illustrations for further study.

Redescription. Female: Body length about 21 mm; forewing length about 18 mm. Head in frontal view subcircular, about 1.25 times as wide as high (Fig. 2A). Vertex with area around ocelli smooth. Distance from posterior ocelli to apical margin of the vertex slightly greater than 1.2 times of the distance from posterior ocellus to inner eye margin. Gena much narrower than eye, in lateral view about 0.4 times as wide as eye; occipital carina complete, present along entire length of the gena, but the carina becomes weaker from one third the height of the gena. Inner eye margins convergent ventrally; in frontal view about 1.1 times further apart from each other at vertex than at clypeus. Clypeus in lateral view prominently convex from base to apical margin; in frontal view about 1.2 times as high as wide (Fig. 2A), with basal margin slightly concave medially and distinctly separated from antennal sockets; apical margin shallowly emarginate medially (Fig. 2A); width of the emargination slightly greater than 1/3 width of clypeus between inner eye margin. Mandible with prominent teeth, the first one short and pointed, second and third teeth longer with inner side round, the outer one pointed apically, with inner margin nearly straight. Antennal scape long, about 3.8 times as long as its maximum width; flagellomere I about 3 times as long as wide, flagellomeres II–VI longer than wide, flagellomeres VII–VIII as long as wide, flagellomeres IX wider than long, terminal flagellomere bullet-shaped, about as long as its basal width.

Mesosoma short, longer than wide in dorsal view. Pronotal carina absent medially, pretegular carina present on pronotum. Mesoscutum weakly convex, slightly longer than wide between tegulae; anterior margin broadly rounded. Scutellum weakly convex. Metanotum weakly convex, slope down to apical margin. Propodeum without fovea, depress in the

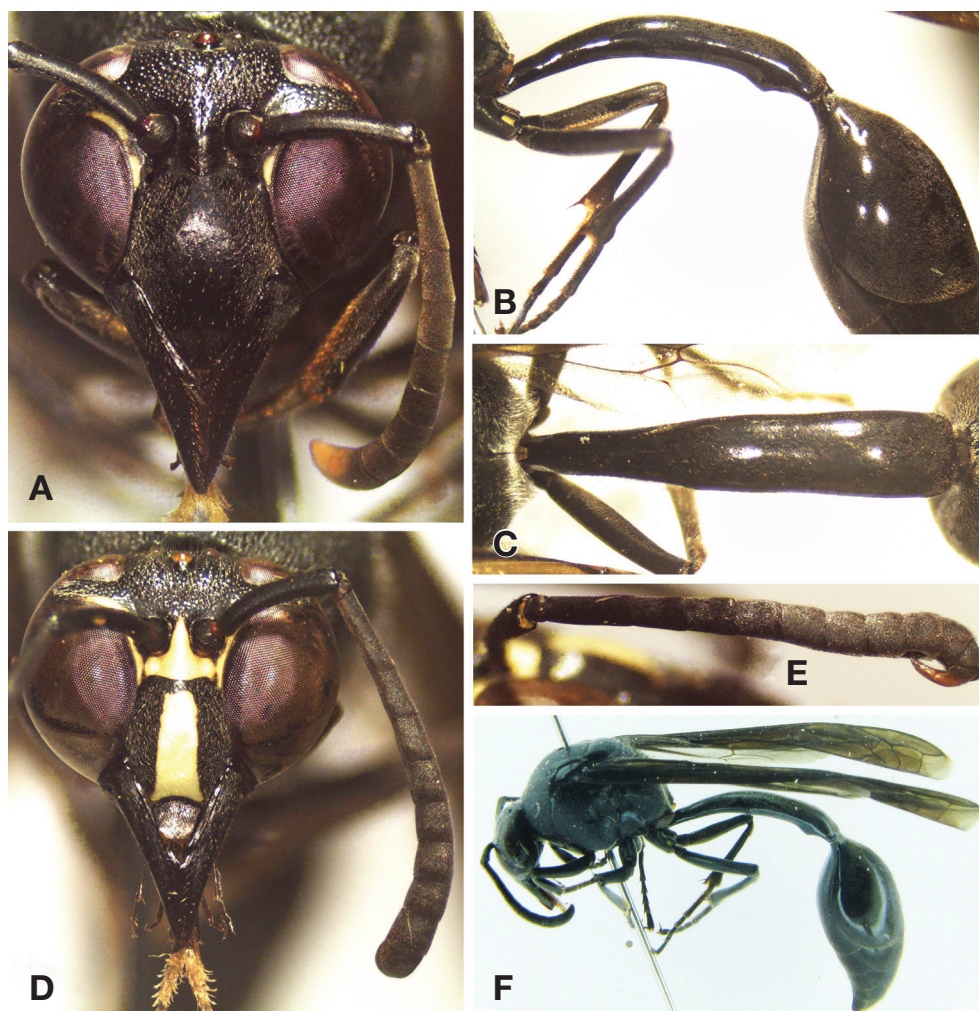


Fig. 2. *Phimenes indosinensis* (van der Vecht). Female: A, Head in frontal view; B, Metasomal segment I and II in lateral view; C, TI in dorsal view. Male: D, Head in frontal view; E, Left antenna; F, Female habitus.

middle, border between dorsal and lateral surfaces round at dorsal part and bluntly angulated at posterior part.

Metasomal segment I petiolate (Fig. 2B), tergum I long, about 5.5 times as long as wide, gradually expand from base to apical margin (Fig. 2C); tergum II in dorsal view about 1.4 times as long as wide, in lateral view dorsally gradually convex basally then nearly flat apically; sternum II nearly flat at base, then gradually convex ventrally to apical margin (Fig. 2B).

Body covered with short, silver hairs except frons, vertex behind ocelli, apical margin of scutellum, metanotum and propodeum with long dense silver hairs.

Clypeus with sparse and small punctures, each bearing a silver bristle, many minutes punctures in between small punctures. Mandible with a longitudinal row of medium-sized punctures near inner side, and several sparse and small

punctures. Frons densely covered with very coarse and flat bottom punctures, interspaces strongly raised to form reticulation. Vertex and gena with sparse, deep and large punctures. Pronotum with punctures coarser than those on the frons, interspaces strongly raised to form reticulation. Basal half of mesocutum similar to those on the frons, apical half densely and coarsely covered with flat-bottomed punctures, interspaces smooth and not raises, in several part interspaces greater than puncture diameter; punctures on scutellum and metanotum sparser and coarser than those on mesoscutum. Mesepisternum with dense, coarse, well-defined punctures posterodorsally, barely punctured anteroventrally; border between posterodorsal and anteroventral parts indistinct. Dorsal metapleuron with several small and shallow punctures, ventral metapleuron smooth. Propodeum with punctures on dorsal parts similar to those on mesopleuron, lateral

surface with shallow, sparse, small punctures near border between dorsal and lateral, the other parts smooth. Metasomal terga covered with minute punctures, punctures on sternum II and III sparse and shallow, punctures on sternum IV–VI denser and deeper.

Color. Black except narrow line on inner eye margin and short narrow band on gena just behind eye yellow; antennal flagellomeres beneath and propodeal valvulae reddish-brown.

Male: Body length about 18 mm; forewing length about 16 mm.

Structure as in female, but differing as follows: head proportionally smaller, transverse, about 1.2 times as wide as high in frontal view (Fig. 2D); eye strongly swollen laterally; inner eye margins strongly convergent, about 1.35 times further apart from each other at vertex than at clypeus; gena very narrow, in lateral view about 0.3 times as wide as eye; clypeus in frontal view higher than wide, about 1.4 times as high as wide, apical margin emarginate medially, forming a blunt tooth on each lateral side (Fig. 2D); width of the emargination slightly more than half width of clypeus between inner eye margins; in lateral view slightly convex from base to apical margin; mandible with four prominent teeth. Antennal scape shorter than in female, about 3.5 times as long as its maximum width; flagellomere I about 3.5 times as long as wide, flagellomere II–V longer than wide, flagellomeres VI about as wide as long, flagellomeres VII–IX wider than long, flagellomere X small, terminal flagellomere elongate, strongly curved, sharply pointed apically and the apex received at basal margin of F8, about 3.5 times as long as its basal width (Fig. 2E).

Body surface sculpture as in female.

Color. Similar to female, but clypeus black with thick longitudinal yellow band at the middle (Fig. 2D), and large yellow spot between antennae. Terminal antennal flagellomere with reddish-brown longitudinal band occupying almost all the segment. Legs reddish-brown.

Key to two *Phimenes* species from Vietnam

The characters are applicable to both sexes unless the sex is specified.

1. Body covered with coarse punctures and long hair. Male clypeus with apical margin deeply emarginate medially, forming a sharp tooth on each lateral side. Body black with extensive yellow marks *P. flavopictus* (Blanchard)
- Body covered with less coarse punctures and shorter hair. Male clypeus with apical margin shallowly emarginate medially, forming a blunt tooth on each lateral side. Body black nearly entirely *P. indosinensis* (van der Vecht)

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